

Length, Breadth, and Dentition in Living Cowries

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(1 Diagram)

THE PRESENT PAPER should be regarded as a continuation of the paper on "The size of ninety-five thousand cowries" (SCHILDER & SCHILDER, 1966): it is an enlargement, as in addition to the length of the shells now also their breadth and the number of labial and columellar teeth have been calculated; and it is at the same time also a restriction, as the median and the limits of usual variation have been indicated only, while the observed accidental extremes (depending on the number of examined specimens) have been omitted. The total number of specimens examined rose to 100 023.

Therefore, in the present list the nomenclature and the arrangement of 208 species and prospecies follow as closely as possible the paper cited above and newest changes in naming (SCHILDER, 1966 b) and placing of the higher taxa (SCHILDER, 1966 a) have been disregarded.

A previous paper (SCHILDER, 1939) on the average length, breadth, and relative number of teeth (calculated for hypothetical shells of 25 mm length) should be cancelled, as it refers to about half as many specimens (60 000) only.

The following list contains these eight columns:

Name of the Genus, species or – prospecies respectively;
 n = number of specimens examined;
 L = length in millimeters;
 BL = relative breadth in per cent of length;
 LT = absolute number of labial teeth;
 CT = absolute number of columellar teeth (the anterior terminal ridges excluded);
 lt = closeness of labial teeth, and
 ct = closeness of columellar teeth, both according to the tables given by SCHILDER, 1958.

In each column
 the two marginal numbers indicate the limits of usual variation, i. e. the variation of two thirds of specimens approaching the mean (see SCHILDER & SCHILDER, 1966, p. 209);
 the central figure (placed in parentheses) indicates the median (see *ibid.*, p. 208).
 In species the number of specimens of which is small, the limits of the standard deviation (σ) and the arithmetic mean have been calculated instead; such figures are presented in *italics* instead of being placed in [] as in SCHILDER & SCHILDER, 1966.

| Name | n | L | BL | LT | CT | lt | ct |
|-------------------------------------|-----|------------|----------------------------|---------|---------|----|----|
| <i>Bernaya</i> | | | | | | | |
| <i>teulerei</i> (CAZENAVETTE, 1846) | 36 | 44(48)52 | 69(72)74 15(16)18 —(—) — | g(h)i | —(—)- | | |
| <i>fultoni</i> (SOWERBY, 1903) | 9 | 55(58)62 | 63(66)68 19(20)21 11(12)13 | i(i)k | e(f)g | | |
| <i>catei</i> SCHILDER, 1963 | 1 | —(76)— | —(65)— —(23)— —(16)— | —(k)— | —(i)— | | |
| <i>Zoila</i> | | | | | | | |
| <i>decipiens</i> (SMITH, 1880) | 60 | 49(53)57 | 65(67)69 20(22)23 16(17)18 | k(l)m | k(l)m | | |
| <i>venusta</i> (SOWERBY, 1846) | 38 | 58(66)78 | 62(64)66 21(24)27 18(20)22 | k(l)n | h(i)k | | |
| <i>thersites</i> (GASKOIN, 1849) | 104 | 66(72)76 | 66(69)71 23(25)27 18(19)20 | l(m)n | k(1)1 | | |
| <i>friendii</i> (GRAY, 1831) | 89 | 57(73)86 | 52(58)64 24(26)28 18(20)22 | l(m)n | k(1)m | | |
| <i>marginata</i> (GASKOIN, 1849) | 8 | 50(55)59 | 57(60)64 26(28)29 18(20)23 | o(p)p | l(n)p | | |
| <i>rosselli</i> (COTTON, 1948) | 5 | 47(50)58 | 66(69)72 24(28)31 19(23)26 | n(p)r | n(p)r | | |
| <i>Siphocypraea</i> | | | | | | | |
| <i>mus</i> (LINNAEUS, 1758) | 120 | 36(40)46 | 68(71)74 16(17)19 11(11)12 | h(i)l | f(f)g | | |

| Name | n | L | BL | LT | CT | lt | ct |
|--------------------------------------|------|-------------|----------|----------|----------|---------|---------|
| <i>Trona</i> | | | | | | | |
| <i>stercoraria</i> (LINNAEUS, 1758) | 720 | 41(52)65 | 63(67)72 | 30(32)34 | 24(26)27 | r(s)u | q(s)t |
| <i>Macrocyprea</i> | | | | | | | |
| <i>zebra</i> (LINNAEUS, 1758) | 213 | 49(72)90 | 51(53)56 | 33(36)39 | 30(32)34 | r(s)u | s(u)v |
| <i>cervus</i> (LINNAEUS, 1771) | 61 | 78(104)122 | 53(57)60 | 39(42)44 | 33(36)39 | r(s)t | r(t)u |
| - <i>cervinetta</i> (KIENER, 1843) | 146 | 51(64)79 | 48(50)53 | 31(33)35 | 26(27)29 | q(r)s | q(r)s |
| <i>Mauritia</i> | | | | | | | |
| <i>valentia</i> (PERRY, 1811) | 6 | 84(92)100 | 70(71)73 | 37(39)41 | 38(40)42 | r(s)t | x(x)y |
| <i>mappa</i> (LINNAEUS, 1758) | 345 | 58(71)78 | 60(63)67 | 34(37)39 | 31(33)35 | r(t)u | t(u)w |
| <i>eglantina</i> (DUCLOS, 1833) | 1285 | 44(51)58 | 56(58)60 | 32(34)36 | 31(34)36 | t(u)v | s(u)v |
| <i>histrio</i> (GMELIN, 1791) | 376 | 50(54)63 | 59(61)65 | 31(33)35 | 25(27)29 | r(t)u | r(s)u |
| <i>grayana</i> SCHILDER, 1930 | 306 | 36(45)61 | 58(61)64 | 30(32)35 | 26(28)30 | s(u)w | t(v)x |
| <i>arabica</i> (LINNAEUS, 1758) | 2645 | 37(44)56 | 60(64)68 | 27(28)31 | 21(23)26 | q(r)t | p(r)t |
| - <i>immanis</i> SCHILDER & | | | | | | | |
| SCHILDER, 1939 | 222 | 66(74)83 | 60(62)65 | 31(33)35 | 27(29)31 | p(q)r | q(r)t |
| <i>maculifera</i> SCHILDER, 1932 | 511 | 47(59)70 | 64(67)71 | 29(31)32 | 23(25)27 | p(q)r | p(q)s |
| <i>depressa</i> (GRAY, 1824) | 300 | 30(36)40 | 69(72)76 | 22(24)26 | 17(18)20 | o(p)r | m(n)p |
| <i>mauritiana</i> (LINNAEUS, 1758) | 951 | 62(78)90 | 66(70)73 | 22(24)27 | 18(20)22 | k(1)n | k(1)n |
| <i>scurra</i> (GMELIN, 1791) | 76 | 32(36)44 | 53(55)58 | 37(39)42 | 26(28)30 | A(C)E | v(x)z |
| - <i>indica</i> (GMELIN, 1791) | 525 | 30(39)45 | 49(52)55 | 40(42)45 | 29(31)33 | B(D)F | x(z)B |
| <i>Talparia</i> | | | | | | | |
| <i>talpa</i> (LINNAEUS, 1758) | 654 | 52(62)74 | 51(53)55 | 42(46)49 | 35(37)40 | x(A)C | x(z)C |
| <i>exusta</i> (SOWERBY, 1832) | 36 | 61(69)76 | 53(56)57 | 54(59)62 | 50(52)55 | D(G)J | H(K)M |
| <i>Cypraea</i> | | | | | | | |
| <i>tigris</i> LINNAEUS, 1758 | 1513 | 67(81)103 | 67(70)73 | 23(25)26 | 21(22)24 | k(1)m | l(m)o |
| <i>pantherina</i> SOLANDER, 1786 | 621 | 56(64)74 | 58(61)63 | 24(26)28 | 26(28)30 | m(n)o | q(s)t |
| <i>Lyncina</i> | | | | | | | |
| <i>aurantium</i> (GMELIN, 1791) | 303 | 90(96)101 | 64(66)68 | 36(38)40 | 32(34)36 | q(r)s | r(t)v |
| <i>broderipii</i> (SOWERBY, 1832) | 6 | 68(78)88 | 63(66)68 | 25(28)31 | 27(30)33 | l(o)r | q(s)t |
| <i>nivosa</i> (BRODERIP, 1827) | 22 | 41(51)60 | 59(61)64 | 26(28)30 | 25(26)27 | o(q)r | r(s)t |
| <i>leucodon</i> (BRODERIP, 1828) | 3 | 77(82)83 | 65(68)71 | 25(25)26 | 21(22)23 | l(l)m | l(m)n |
| <i>porteri</i> (CATE, 1966) | 1 | —(47)— | —(74)— | —(30)— | —(29)— | —(s)— | —(v)— |
| <i>argus</i> (LINNAEUS, 1758) | 272 | 59(70)83 | 50(52)55 | 35(37)39 | 31(33)35 | s(t)u | t(v)w |
| <i>lynx</i> (LINNAEUS, 1758) | 2991 | 30(35)41 | 57(60)63 | 22(23)25 | 18(19)20 | o(p)q | n(o)q |
| <i>vitellus</i> (LINNAEUS, 1758) | 1170 | 36(44)54 | 61(63)66 | 24(26)27 | 10(21)23 | o(p)q | o(p)r |
| <i>camelopardalis</i> (PERRY, 1811) | 79 | 46(54)64 | 58(61)64 | 25(26)28 | 25(27)29 | n(o)p | r(t)u |
| <i>reevei</i> (SOWERBY, 1832) | 53 | 29(34)39 | 60(64)66 | 30(32)34 | 23(25)27 | v(w)y | t(v)x |
| <i>ventriculus</i> (LAMARCK, 1810) | 121 | 41(49)57 | 64(67)69 | 22(24)26 | 19(21)22 | m(n)o | n(o)p |
| <i>schilderorum</i> (IREDALE, 1939) | 139 | 27(30)34 | 64(69)73 | 26(28)29 | 21(22)24 | s(u)v | s(t)v |
| - <i>kuroharai</i> (KURODA & | | | | | | | |
| HABE, 1961) | 4 | 41(44)47 | 67(69)71 | 27(28)28 | 26(27)28 | q(r)r | u(v)w |
| <i>sulcidentata</i> (GRAY, 1824) | 135 | 32(39)48 | 68(72)76 | 24(26)27 | 20(21)23 | o(q)r | o(q)r |
| <i>carneola</i> (LINNAEUS, 1758) | 3538 | 24(28)34 | 58(61)65 | 23(25)26 | 19(20)22 | q(s)t | p(r)t |
| - <i>titan</i> SCHILDER & | | | | | | | |
| SCHILDER, 1962 | 156 | 43(49)56 | 55(57)60 | 27(29)31 | 23(24)26 | p(r)s | q(r)s |
| - <i>leviathan</i> (SCHILDER & | | | | | | | |
| SCHILDER, 1937) | 59 | 63(72)86 | 55(58)62 | 32(36)39 | 27(30)32 | q(s)u | q(s)u |
| <i>Chelycypraea</i> | | | | | | | |
| <i>testudinaria</i> (LINNAEUS, 1758) | 178 | 86(103)123 | 49(51)52 | 45(49)52 | 38(42)45 | u(w)x | v(x)y |

| Name | n | L | BL | LT | CT | lt | ct |
|--|-------|------------|----------------------------|---------|---------|----|----|
| <i>Luria</i> | | | | | | | |
| <i>tessellata</i> (SWAINSON, 1822) | 98 | 23(27)32 | 68(71)74 25(27)29 20(22)25 | t(u)w | r(u)x | | |
| <i>pulchra</i> (GRAY, 1828) | 91 | 35(41)54 | 54(56)58 36(39)42 31(34)37 | y(A)C | z(B)E | | |
| <i>isabella</i> (LINNAEUS, 1758) | 3979 | 20(25)29 | 52(55)57 28(30)32 25(27)29 | B(D)G | y(A)C | | |
| - <i>mexicana</i> (STEARNS, 1893) | 166 | 30(36)40 | 49(53)58 35(38)40 29(32)35 | y(B)C | y(B)E | | |
| <i>cinerea</i> (GMELIN, 1791) | 625 | 21(25)30 | 60(63)67 23(24)26 16(18)20 | r(s)u | n(p)r | | |
| <i>lurida</i> (LINNAEUS, 1758) | 628 | 23(33)44 | 56(59)62 22(23)25 17(18)19 | o(p)r | m(o)q | | |
| <i>Pustularia</i> | | | | | | | |
| <i>mariae</i> SCHILDER, 1927 | 108 | 11(13)16 | 65(66)70 31(34)36 21(23)26 | K(N)Q | A(D)H | | |
| <i>globulus</i> (LINNAEUS, 1758) | 395 | 12(16)19 | 60(62)65 27(29)31 18(20)22 | A(D)F | t(v)y | | |
| <i>margarita</i> (DILLWYN, 1817) | 381 | 11(12)15 | 58(61)65 26(28)30 17(19)21 | D(F)J | v(y)A | | |
| <i>cicercula</i> (LINNAEUS, 1758) | 445 | 14(16)19 | 59(62)66 26(28)31 19(21)22 | z(C)F | u(x)z | | |
| <i>olowaluensis</i> (BURGESS MS.) | 7 | 12(13)14 | 60(63)65 21(23)25 17(18)18 | w(y)A | r(u)w | | |
| <i>bistrinotata</i> SCHILDER & | | | | | | | |
| SCHILDER, 1937 | 503 | 13(15)18 | 60(62)65 25(27)29 16(18)20 | y(B)D | r(t)w | | |
| <i>childreni</i> (GRAY, 1825) | 176 | 14(17)21 | 62(67)69 30(32)34 20(22)23 | D(G)J | v(y)A | | |
| <i>Propustularia</i> | | | | | | | |
| <i>surinamensis</i> (PERRY, 1811) | 33 | 28(31)35 | 58(61)63 20(23)25 16(18)20 | n(q)r | m(o)q | | |
| <i>Monetaria</i> | | | | | | | |
| <i>annulus</i> (LINNAEUS, 1758) | 10484 | 16(19)22 | 68(72)76 11(12)13 10(11)11 | f(g)h | f(g)h | | |
| - <i>obvelata</i> (LAMARCK, 1810) | 756 | 14(16)21 | 64(68)73 11(12)12 9(9)10 | f(g)g | e(f)g | | |
| <i>moneta</i> (LINNAEUS, 1758) | 5306 | 16(20)25 | 67(73)78 11(12)13 10(11)12 | f(g)h | g(h)i | | |
| <i>Naria</i> | | | | | | | |
| <i>irrorata</i> (GRAY, 1828) | 276 | 10(11)13 | 54(57)60 18(20)22 15(17)18 | r(u)w | s(v)w | | |
| <i>Erosaria</i> | | | | | | | |
| <i>dillwyni</i> (SCHILDER, 1922) | 62 | 11(12)13 | 58(60)62 29(31)33 18(20)22 | H(M)O | w(z)C | | |
| <i>beckii</i> (GASKOIN, 1836) | 71 | 8(10)11 | 57(58)61 16(18)21 15(17)19 | s(t)x | t(w)z | | |
| <i>macandrewi</i> (SOWERBY, 1870) | 43 | 12(14)17 | 54(55)57 18(19)20 17(19)21 | q(r)t | t(v)y | | |
| <i>labrolineata</i> (GASKOIN, 1849) | 1152 | 12(14)18 | 58(60)63 14(16)17 14(15)16 | l(n)o | m(o)r | | |
| <i>cernica</i> (SOWERBY, 1870) | 48 | 19(22)25 | 63(69)73 18(19)20 15(17)18 | n(o)p | m(o)q | | |
| - <i>tomlini</i> SCHILDER, 1930 | 62 | 12(18)24 | 60(63)68 17(18)20 15(16)17 | n(o)q | n(o)q | | |
| - <i>ogasawarensis</i> SCHILDER, 1944 | 34 | 18(22)31 | 60(64)71 18(19)21 16(17)18 | n(o)q | n(o)q | | |
| <i>citrina</i> (GRAY, 1825) | 56 | 19(21)25 | 60(63)68 19(20)21 17(19)20 | o(p)r | p(q)t | | |
| <i>gangranosa</i> (DILLWYN, 1817) | 1261 | 15(18)21 | 58(61)65 18(19)21 15(17)18 | o(p)r | o(q)s | | |
| <i>boivinii</i> (KIENER, 1843) | 1379 | 19(22)25 | 60(62)66 18(19)20 14(16)17 | n(o)p | l(n)p | | |
| - <i>ostergaardi</i> (DALL, 1921) | 16 | 15(19)21 | 64(69)73 18(20)22 14(15)17 | o(q)s | l(n)q | | |
| <i>helvola</i> (LINNAEUS, 1758) | 3083 | 17(20)23 | 64(68)74 16(17)19 13(14)15 | l(m)o | k(l)n | | |
| <i>caputserpentis</i> (LINNAEUS, 1758) | 3574 | 25(29)32 | 70(74)80 16(17)18 12(13)14 | i(k)l | h(i)k | | |
| <i>caputdraconis</i> (MELVILL, 1888) | 141 | 25(29)33 | 67(70)73 15(16)17 12(13)14 | h(i)k | h(i)k | | |
| <i>albuginosa</i> (GRAY, 1825) | 140 | 19(23)27 | 56(60)65 19(21)22 16(17)19 | o(q)r | n(p)r | | |
| <i>spurca</i> (LINNAEUS, 1758) | 1656 | 21(25)28 | 61(63)66 18(20)21 14(15)17 | m(o)p | k(l)n | | |
| - <i>acicularis</i> (GMELIN, 1791) | 321 | 16(20)23 | 63(67)71 17(18)19 13(14)15 | m(n)o | k(l)n | | |
| <i>poraria</i> (LINNAEUS, 1758) | 680 | 14(16)18 | 66(69)73 17(19)21 13(14)16 | o(q)s | m(n)p | | |
| <i>englerti</i> (BURGESS & | | | | | | | |
| SUMMERS, 1965) | 3 | 23(24)24 | 70(72)75 18(19)20 15(16)16 | m(n)o | m(n)n | | |
| <i>erosa</i> (LINNAEUS, 1758) | 3417 | 25(30)35 | 58(62)66 17(18)19 13(14)15 | k(l)m | i(k)l | | |
| - <i>nebrites</i> (MELVILL, 1888) | 294 | 21(26)30 | 63(65)69 16(17)18 13(15)16 | k(l)m | i(l)m | | |
| <i>ocellata</i> (LINNAEUS, 1758) | 359 | 19(24)29 | 63(67)72 17(18)19 14(15)16 | l(m)n | k(l)n | | |
| <i>marginalis</i> (DILLWYN, 1827) | 172 | 22(26)30 | 63(66)70 18(20)22 20(22)24 | m(o)q | o(p)s | | |
| <i>miliaris</i> (GMELIN, 1791) | 538 | 25(32)37 | 60(63)66 17(17)18 13(14)15 | k(k)l | h(i)k | | |

| Name | n | L | BL | LT | CT | lt | ct |
|--|------|-------------|----------|----------|----------|---------|---------|
| <i>Erosaria</i> (cont.) | | | | | | | |
| - <i>eburnea</i> (BARNES, 1824) | 155 | 33(38)44 | 59(61)63 | 18(19)20 | 14(15)16 | k(1)m | i(k)l |
| - <i>lamarckii</i> (GRAY, 1825) | 509 | 29(33)38 | 63(67)70 | 17(18)19 | 14(15)16 | k(1)m | i(k)l |
| - - <i>redimita</i> (MELVILL, 1888) | 170 | 27(30)35 | 63(66)70 | 17(18)19 | 13(14)16 | k(1)m | i(k)m |
| <i>turdus</i> (LAMARCK, 1810) | 922 | 24(30)38 | 64(69)73 | 16(17)18 | 14(15)17 | i(k)l | k(1)n |
| <i>guttata</i> (GMELIN, 1791) | 18 | 53(62)66 | 58(60)64 | 22(25)28 | 18(20)22 | l(m)o | l(m)o |
| <i>Staphylaea</i> | | | | | | | |
| <i>staphylaea</i> (LINNAEUS, 1758) | 1157 | 11(15)19 | 59(62)65 | 19(20)22 | 15(17)18 | q(s)v | p(r)t |
| <i>limacina</i> (LAMARCK, 1810) | 387 | 19(24)28 | 56(58)60 | 20(22)24 | 16(18)21 | o(q)s | n(q)t |
| <i>semiplota</i> (MIGHELS, 1845) | 227 | 11(14)20 | 57(60)65 | 17(19)20 | 15(16)17 | p(r)t | p(r)t |
| <i>Nuclearia</i> | | | | | | | |
| <i>nucleus</i> (LINNAEUS, 1758) | 1177 | 16(19)23 | 59(62)65 | 23(24)26 | 15(16)17 | t(v)x | n(o)q |
| - <i>granulata</i> (PEASE, 1862) | 140 | 22(27)31 | 66(69)73 | 21(23)25 | 18(20)21 | p(r)s | o(r)s |
| - <i>cassiaui</i> (BURGESS, 1965) | 11 | 23(26)28 | 64(69)73 | 20(21)22 | 13(15)16 | o(p)q | k(l)m |
| <i>Schilderia</i> | | | | | | | |
| <i>achatidea</i> (SOWERBY, 1837) | 125 | 27(33)38 | 61(63)65 | 27(29)30 | 23(25)27 | t(u)v | p(r)s |
| <i>langfordi</i> (KURODA, 1938) | 5 | 50(54)58 | 61(63)68 | 27(29)30 | 24(25)26 | p(q)r | q(r)s |
| - <i>moretonensis</i> SCHILDER, 1965 | 4 | 54(59)65 | 58(60)63 | 27(29)31 | 25(26)27 | o(p)r | q(r)s |
| <i>hirasei</i> (ROBERTS, 1913) | 9 | 46(50)54 | 62(64)66 | 27(28)29 | 23(25)28 | o(q)r | q(s)t |
| <i>queenslandica</i> SCHILDER, 1966 | 1 | —(57)— | —(61)— | —(33)— | —(37)— | —(s)— | —(A)— |
| <i>teramachii</i> (KURODA, 1938) | 6 | 60(67)74 | 59(61)64 | 30(32)34 | 26(28)29 | p(q)r | p(r)t |
| <i>Zonaria</i> | | | | | | | |
| <i>zonaria</i> (GMELIN, 1791) | 164 | 24(28)33 | 60(63)66 | 19(20)21 | 14(16)18 | m(n)o | k(m)o |
| <i>picta</i> (GRAY, 1824) | 192 | 24(27)31 | 55(59)63 | 17(19)21 | 16(18)20 | l(m)o | n(p)r |
| <i>sanguinolenta</i> (GMELIN, 1791) | 37 | 19(21)24 | 57(59)61 | 19(20)22 | 14(15)17 | o(p)r | m(n)p |
| <i>pyrum</i> (GMELIN, 1791) | 322 | 28(33)38 | 57(59)61 | 18(20)22 | 14(15)16 | l(n)o | i(k)l |
| - <i>petitiana</i> (CROSSE, 1872) | 33 | 20(25)35 | 59(61)65 | 17(19)20 | 13(15)17 | l(n)o | i(l)n |
| <i>annettiae</i> (DALL, 1909) | 112 | 29(35)43 | 55(57)61 | 20(21)22 | 15(17)19 | m(n)o | k(m)o |
| - <i>aequinoctialis</i> SCHILDER, 1933 | 13 | 38(40)45 | 57(61)63 | 18(19)20 | 13(14)16 | k(1)l | g(i)l |
| <i>spadicea</i> (SWAINSON, 1823) | 120 | 38(44)50 | 57(59)60 | 21(23)25 | 19(20)21 | m(n)o | n(o)p |
| <i>robertsi</i> (HIDALGO, 1906) | 117 | 21(24)28 | 64(68)71 | 17(18)19 | 12(13)14 | l(m)n | h(i)k |
| <i>nigropunctata</i> (GRAY, 1828) | 224 | 22(26)32 | 54(57)58 | 19(21)22 | 15(16)18 | n(p)q | l(m)o |
| <i>arabicula</i> (LAMARCK, 1810) | 119 | 21(26)30 | 61(66)69 | 21(22)24 | 15(16)17 | p(q)s | l(m)n |
| <i>Cypraeovula</i> | | | | | | | |
| <i>fuscorubra</i> (SHAW, 1909) | 34 | 33(37)42 | 62(65)73 | 18(20)22 | 18(19)21 | k(m)o | n(o)q |
| <i>fuscodentata</i> (GRAY, 1825) | 245 | 28(31)34 | 56(58)60 | 16(17)18 | 13(14)16 | i(k)l | i(k)m |
| <i>cohenae</i> (BURGESS, 1965) | 2 | 25(27)29 | 60(60)60 | 16(16)17 | —(—)— | k(k)k | —(—)— |
| <i>algoensis</i> (GRAY, 1825) | 46 | 20(24)26 | 59(63)65 | 20(21)22 | 15(16)17 | o(p)q | m(n)o |
| <i>edentula</i> (GRAY, 1825) | 418 | 21(24)26 | 60(62)64 | 21(23)25 | 24(28)30 | p(r)t | x(C)E |
| <i>amphithales</i> (MELVILL, 1888) | 5 | 26(28)30 | 58(59)60 | 21(23)26 | 21(27)33 | r(s)t | t(z)G |
| <i>capensis</i> (GRAY, 1828) | 329 | 29(31)33 | 57(59)61 | 25(26)28 | 38(44)47 | r(s)u | L(P)T |
| <i>Umbilia</i> | | | | | | | |
| <i>armeniaca</i> (VERCO, 1912) | 5 | 77(86)95 | 61(70)80 | 33(36)39 | 24(26)29 | q(r)s | n(p)r |
| - <i>hesitata</i> (IREDALE, 1916) | 135 | 75(91)100 | 56(58)61 | 34(37)39 | 27(29)31 | p(r)s | p(q)r |
| <i>Notocypraea</i> | | | | | | | |
| <i>pulicaria</i> (REEVE, 1846) | 82 | 16(17)19 | 55(57)58 | 23(25)26 | 22(23)25 | v(x)y | y(A)C |
| <i>bicolor</i> (GASKOIN, 1849) | 120 | 19(21)23 | 57(59)61 | 23(24)25 | 19(20)22 | s(u)v | s(t)w |
| - <i>occidentalis</i> IREDALE, 1935 | 136 | 17(19)21 | 58(59)61 | 23(24)26 | 19(20)22 | u(v)x | t(v)x |
| <i>piperita</i> (GRAY, 1825) | 521 | 20(22)24 | 58(61)64 | 22(24)26 | 18(20)22 | r(t)v | r(t)w |
| <i>angustata</i> (GMELIN, 1791) | 271 | 23(26)28 | 65(68)70 | 22(24)26 | 18(20)21 | q(s)u | p(r)t |
| <i>declivis</i> (SOWERBY, 1870) | 37 | 22(25)27 | 64(66)69 | 23(24)26 | 18(20)21 | r(s)u | o(r)s |

| Name | n | L | BL | LT | CT | lt | ct |
|--|------|------------|----------|----------|----------|---------|---------|
| <i>Erronea</i> | | | | | | | |
| <i>walkeri</i> (SOWERBY, 1832) | 114 | 20(23)28 | 57(59)61 | 20(21)23 | 19(21)23 | p(q)s | r(t)w |
| - <i>bregeriana</i> (CROSSE, 1868) | 33 | 19(22)28 | 58(61)63 | 18(20)21 | 17(19)20 | n(p)q | p(r)t |
| <i>pyriformis</i> (GRAY, 1824) | 130 | 22(25)29 | 59(61)63 | 18(19)21 | 17(19)20 | m(n)p | o(q)s |
| <i>peluchella</i> (SWAINSON, 1823) | 52 | 35(38)41 | 54(57)59 | 26(28)30 | 21(23)24 | q(s)u | q(s)t |
| - <i>novaebritanniae</i> SCHILDER & SCHILDER, 1937 | 5 | 23(24)25 | 55(56)57 | 22(24)26 | 19(21)22 | q(t)v | r(t)v |
| - <i>pericalles</i> (MELVILL & STANDEN, 1904) | 18 | 28(31)34 | 54(56)57 | 23(24)25 | 17(19)21 | o(q)s | n(p)s |
| <i>hungerfordi</i> (SOWERBY, 1888) | 22 | 31(33)36 | 59(62)64 | 22(23)24 | 18(20)22 | o(p)q | n(p)s |
| - <i>coucomi</i> SCHILDER, 1964 | 10 | 28(34)40 | 56(58)61 | 22(25)27 | 19(22)24 | p(q)r | p(r)t |
| <i>barclayi</i> (REEVE, 1837) | 3 | 22(24)26 | 61(64)67 | 21(22)23 | 17(18)18 | q(r)r | o(o)p |
| <i>xanthodon</i> (SOWERBY, 1832) | 1146 | 23(26)29 | 58(60)63 | 20(21)22 | 16(17)18 | o(p)q | m(n)o |
| <i>vredenburgi</i> SCHILDER, 1927 | 1596 | 18(21)24 | 60(62)64 | 19(20)21 | 14(15)16 | o(p)q | l(n)o |
| <i>pallida</i> (GRAY, 1828) | 720 | 22(24)26 | 62(64)65 | 17(18)19 | 14(15)16 | l(m)n | l(m)n |
| <i>subviridis</i> (REEVE, 1835) | 208 | 26(30)35 | 61(64)66 | 17(18)19 | 16(17)19 | k(l)m | i(k)m |
| - <i>dorsalis</i> SCHILDER & SCHILDER, 1938 | 120 | 26(30)34 | 58(60)63 | 18(19)20 | 18(19)21 | l(m)n | l(m)o |
| - <i>piscatorum</i> SCHILDER, 1965 | 2 | 30(31)31 | 60(62)63 | 22(22)22 | 15(16)17 | o(p)p | l(m)n |
| <i>onyx</i> (LINNAEUS, 1758) | 84 | 32(37)43 | 59(61)64 | 19(20)21 | 15(16)17 | l(m)n | k(l)m |
| - <i>melanesiae</i> SCHILDER & SCHILDER, 1937 | 8 | 32(39)46 | 56(60)64 | 19(20)21 | 14(17)19 | k(l)n | i(m)o |
| - <i>nymphae</i> (JAY, 1850) | 40 | 36(41)45 | 59(60)62 | 19(21)22 | 15(16)17 | l(m)n | k(l)m |
| - <i>adusta</i> (LAMARCK, 1810) | 121 | 36(41)47 | 58(60)62 | 18(20)21 | 16(17)19 | k(l)m | l(m)o |
| <i>ovum</i> (GMELIN, 1791) | 575 | 23(26)30 | 56(58)61 | 15(16)17 | 15(16)18 | i(k)l | l(m)o |
| <i>errones</i> (LINNAEUS, 1758) | 3489 | 19(23)28 | 54(56)58 | 14(15)16 | 13(14)16 | h(i)k | k(l)n |
| <i>cylindrica</i> (BORN, 1778) | 203 | 24(28)33 | 45(48)50 | 15(17)19 | 19(21)22 | i(k)m | q(s)t |
| - <i>sowerbyana</i> SCHILDER, 1932 | 121 | 27(30)34 | 50(51)53 | 18(19)20 | 19(20)22 | l(m)n | p(r)t |
| <i>caurica</i> (LINNAEUS, 1758) | 1503 | 29(35)41 | 52(55)59 | 16(18)19 | 16(18)19 | i(k)l | l(n)o |
| <i>felina</i> (GMELIN, 1791) | 353 | 16(18)21 | 59(62)67 | 14(15)16 | 12(13)14 | i(l)m | i(k)l |
| - <i>listeri</i> (GRAY, 1824) | 649 | 12(15)18 | 53(55)58 | 13(15)16 | 12(14)15 | i(l)m | k(m)o |
| <i>Notadusta</i> | | | | | | | |
| <i>punctata</i> (LINNAEUS, 1771) | 563 | 9(11)14 | 55(57)60 | 19(20)22 | 17(19)20 | t(v)y | v(y)A |
| <i>rabaulensis</i> SCHILDER, 1964 | 7 | 19(21)23 | 50(52)54 | 20(21)23 | 22(23)24 | o(q)s | v(x)z |
| <i>katsuae</i> (KURODA, 1960) | 5 | 19(21)22 | 54(56)58 | 28(30)32 | 24(26)28 | y(B)E | y(B)E |
| <i>martini</i> (SCHEPMAN, 1907) | 12 | 14(16)17 | 50(52)54 | 20(22)23 | 25(27)28 | s(u)v | F(H)J |
| <i>superstes</i> (SCHILDER, 1930) | 8 | 17(18)19 | 52(54)55 | 26(28)29 | 28(31)33 | x(z)B | H(L)O |
| <i>Palmadusta</i> | | | | | | | |
| <i>asellus</i> (LINNAEUS, 1758) | 1626 | 13(15)17 | 55(59)62 | 17(19)20 | 13(14)16 | o(q)r | l(o)q |
| <i>clandestina</i> (LINNAEUS, 1767) | 1072 | 11(14)17 | 59(61)64 | 16(18)20 | 14(15)17 | o(q)s | n(p)s |
| <i>artuffcli</i> (JOSSEAUIME, 1876) | 134 | 14(16)18 | 59(61)62 | 17(18)20 | 14(16)17 | o(p)r | n(p)r |
| <i>saulae</i> (GASKOIN, 1843) | 44 | 20(23)27 | 53(56)58 | 18(19)20 | 16(17)18 | m(o)p | n(p)q |
| <i>contaminata</i> (SOWERBY, 1832) | 44 | 9(11)13 | 56(58)60 | 19(20)21 | 16(17)19 | t(w)x | t(v)y |
| <i>lutea</i> (GMELIN, 1791) | 79 | 15(18)20 | 55(58)60 | 17(19)21 | 15(16)17 | n(p)r | n(p)r |
| - <i>humphreysii</i> (GRAY, 1825) | 130 | 12(15)19 | 58(60)62 | 15(17)18 | 14(16)17 | m(o)p | n(q)s |
| <i>ziczag</i> (LINNAEUS, 1758) | 284 | 13(16)19 | 59(61)64 | 18(20)21 | 15(17)19 | p(r)s | p(s)u |
| <i>diluculum</i> (REEVE, 1845) | 201 | 17(23)28 | 60(61)64 | 18(19)20 | 16(17)18 | m(n)p | n(o)q |
| <i>lentiginosa</i> (GRAY, 1825) | 48 | 21(26)31 | 57(60)66 | 17(18)19 | 13(15)16 | l(m)n | i(l)m |
| <i>Purpuradusta</i> | | | | | | | |
| <i>gracilis</i> (GASKOIN, 1849) | 1688 | 14(16)19 | 58(60)62 | 16(17)18 | 13(14)16 | m(n)p | l(n)q |
| <i>hammondae</i> (IREDALE, 1939) | 52 | 12(14)15 | 58(60)62 | 14(15)16 | 14(15)16 | n(p)q | o(p)r |

| Name | n | L | BL | LT | CT | lt | ct |
|--|------|------------|----------|----------|----------|---------|---------|
| <i>Purpuradusta</i> (cont.) | | | | | | | |
| - <i>raysummersi</i> SCHILDER, 1960 | 39 | 13(15)16 | 54(56)58 | 19(20)21 | 16(17)19 | q(r)t | q(r)u |
| <i>fimbriata</i> (GMELIN, 1791) | 584 | 11(12)14 | 55(57)59 | 16(17)19 | 15(16)18 | o(p)s | q(t)w |
| <i>minoridens</i> (MELVILL, 1901) | 1274 | 7(8) 9 | 53(55)56 | 16(17)19 | 15(17)18 | r(t)w | v(y)A |
| <i>serrulifera</i> (SCHILDER & SCHILDER, 1938) | 80 | 7(8) 9 | 50(52)61 | 19(21)22 | 18(19)21 | x(z)B | A(C)F |
| <i>microdon</i> (GRAY, 1828) | 239 | 8(10)12 | 53(55)57 | 20(22)24 | 19(20)22 | w(z)B | A(B)E |
| <i>Blasicrura</i> | | | | | | | |
| <i>quadrimaculata</i> (GRAY, 1824) | 264 | 17(20)23 | 49(51)54 | 17(19)20 | 17(19)21 | m(o)p | p(s)u |
| <i>coxeni</i> (Cox, 1873) | 82 | 19(22)26 | 49(53)57 | 16(18)19 | 16(17)19 | l(n)o | n(p)s |
| - <i>hesperina</i> SCHILDER & SUMMERS, 1963 | 44 | 15(17)20 | 49(51)53 | 15(16)18 | 15(17)18 | l(m)o | o(q)s |
| <i>interrupta</i> (GRAY, 1824) | 414 | 18(20)22 | 51(52)55 | 20(21)23 | 19(20)22 | s(u)w | s(t)w |
| - <i>pallidula</i> (GASKOIN, 1849) | 860 | 15(16)19 | 55(57)58 | 18(20)21 | 15(16)17 | p(r)t | o(q)s |
| - <i>summersi</i> (SCHILDER, 1958) | 169 | 14(15)17 | 53(55)57 | 17(18)19 | 11(12)14 | o(p)q | i(k)n |
| <i>rashleighana</i> (MELVILL, 1888) | 16 | 14(15)18 | 60(62)63 | 15(16)18 | 14(17)19 | m(n)p | n(r)u |
| - <i>eunota</i> (TAYLOR, 1916) | 32 | 19(23)26 | 62(67)71 | 17(19)20 | 15(16)17 | l(n)o | m(n)p |
| - <i>latior</i> (MELVILL, 1888) | 50 | 27(32)37 | 61(64)68 | 20(23)24 | 19(20)22 | n(p)q | p(q)s |
| <i>teres</i> (GMELIN, 1791) | 1333 | 21(24)29 | 52(54)57 | 22(24)25 | 21(22)25 | q(s)t | t(v)y |
| - <i>subteres</i> (WEINKAUFF, 1881) | 29 | 17(21)26 | 46(47)49 | 24(25)27 | 24(25)26 | t(u)x | y(A)B |
| <i>goodallii</i> (SOWERBY, 1832) | 83 | 9(10)13 | 54(55)59 | 19(21)22 | 16(18)19 | u(x)z | u(x)z |
| <i>Bistolidida</i> | | | | | | | |
| <i>kieneri</i> (HIDALGO, 1906) | 656 | 11(13)18 | 55(57)60 | 15(16)17 | 12(13)15 | m(o)p | l(n)p |
| <i>owenii</i> (SOWERBY, 1837) | 118 | 10(14)16 | 57(60)67 | 15(16)17 | 12(13)14 | m(o)p | k(1)n |
| <i>hirundo</i> (LINNAEUS, 1758) | 821 | 12(15)17 | 55(59)62 | 19(20)22 | 14(16)17 | q(s)u | o(q)s |
| <i>ursellus</i> (GMELIN, 1791) | 462 | 9(11)13 | 59(61)63 | 19(20)21 | 15(16)18 | t(v)x | r(t)w |
| <i>erythraeensis</i> (SOWERBY, 1837) | 33 | 16(19)22 | 56(59)62 | 19(21)22 | 16(18)19 | p(r)s | p(s)t |
| <i>stolida</i> (LINNAEUS, 1758) | 444 | 21(24)29 | 55(58)62 | 19(21)22 | 15(17)19 | n(p)q | m(o)q |
| <i>Ovatipsida</i> | | | | | | | |
| <i>chinensis</i> (GMELIN, 1791) | 348 | 27(32)38 | 58(61)66 | 16(18)18 | 16(17)18 | i(1)l | l(n)o |
| - <i>tortirostris</i> (SOWERBY, 1906) | 12 | 9(12)14 | 56(61)66 | 9(10)11 | 9(11)13 | d(e)g | f(i)l |
| - <i>coloba</i> (MELVILL, 1888) | 92 | 22(26)30 | 67(73)78 | 14(15)16 | 14(15)17 | h(i)k | k(1)n |
| <i>Cribaria</i> | | | | | | | |
| <i>cribraria</i> (LINNAEUS, 1758) | 641 | 17(21)26 | 56(58)62 | 16(18)20 | 15(17)19 | l(n)p | n(p)r |
| <i>cribellum</i> (GASKOIN, 1849) | 51 | 12(14)16 | 54(56)58 | 13(14)17 | 13(14)16 | k(1)o | l(n)q |
| <i>esontropia</i> (DUCLOS, 1833) | 82 | 17(24)28 | 56(61)66 | 16(17)18 | 14(16)18 | k(1)m | l(n)p |
| <i>catholicorum</i> SCHILDER & SCHILDER, 1938 | 114 | 12(14)16 | 61(63)65 | 16(17)18 | 14(15)17 | o(p)q | o(q)t |
| <i>gaskoini</i> (REEVE, 1846) | 69 | 13(20)24 | 59(63)70 | 19(20)21 | 16(18)20 | o(p)r | p(r)t |
| <i>cumingii</i> (SOWERBY, 1832) | 73 | 10(11)14 | 53(56)58 | 23(27)30 | 21(23)26 | z(G)L | C(F)L |

DISCUSSION

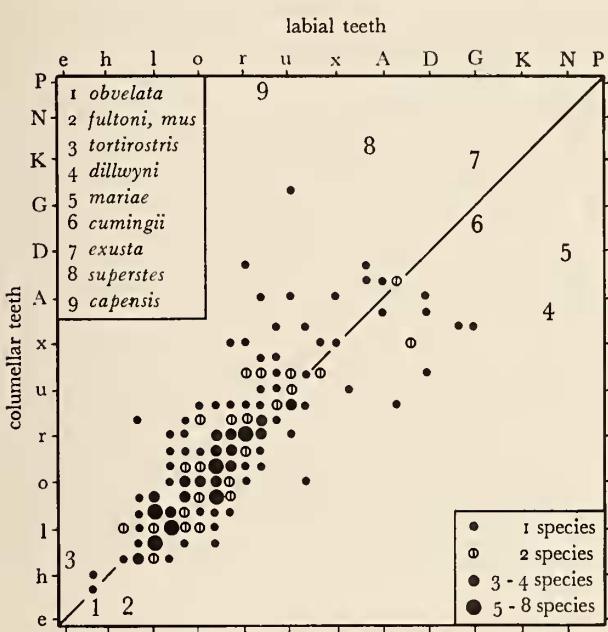
From the preceding list the following results have been obtained:

1. There is no correlation between the average length and the relative breadth among the 208 species and prospecies: among small species the slender and the broad species are distributed in about the same random way as

among large species. Thus, among rather small species of about 2 cm the relative breadth ranges from 47 (*Blasicrura teres subteres*) to 73 (*Monetaria moneta*) and among giant species of 9 to 10 cm it ranges from 51 (*Cheleycypraea testudinaria*) to 71 (*Mauritia valentia*).

2. There is, however, a general distinct correlation between the closeness of the labial and the columellar teeth, as coarse distant labial teeth generally are linked

up to coarse columellar teeth, and numerous labial teeth to numerous columellar teeth (see the Diagram, in which



the two species without columellar teeth [*Bernaya teulerei*, *Cypraeovula cohenae*] have been omitted). Thus, for instance, in the three species of *Monetaria* the teeth of both lips are coarse (class gf to gh), while in some phylogenetically separated species as *Talparia exusta*

(GK), *Pustularia mariae* (ND), and *Cibraria cumingii* (GF) the teeth of both lips are extremely fine and numerous.

3. But there is no strict correspondence of the closeness of labial teeth to that of columellar teeth, as there are many species in which the columellar teeth are distinctly more numerous than the labial teeth, and *vice versa*. Thus in *Erosaria dillwyni* (class Mz) the labial teeth are much finer than the columellar teeth, while in *Notadusta superstes* (class zL) the columellar teeth are extremely fine.

4. There is no correlation between the average length of the species and the number of teeth, a fact which justifies the method of calculating the relative closeness of dentition: coarse, distant teeth occur among small species (*Ovatipsa chinensis tortirostris*) as well as among large species (*Bernaya fultoni*), and close numerous teeth also occur among small species (*Pustularia mariae*) as well as among large cowries (*Talparia exusta*).

5. The average length and relative breadth (L/BL) in all 208 living Cypraeidae is 26/61; this formula is approached by *Erronea pyriformis* (25/61) and *E. xanthodon* (26/60). The average closeness of labial and columellar teeth (Lt:ct) is p:q, represented by *Erosaria gangranosa*.

6. The following Table refers to medians (placed in parentheses in the preceding list) of 208 species and pro-species of living Cypraeidae; it indicates the median of the medians, the usual variation of the medians (s_1 , s_2) and their extremes (mi, ma), with the names of the typical species added.

| | mi | s_1 | Med | s_2 | ma |
|-----|--------------------------------|----------------------------|----------------------------|---------------------------|--------------------------------|
| L: | 8 | 16 | 26 | 52 | 104 |
| | <i>Purpuradusta minoridens</i> | <i>Erosaria poraria</i> | <i>Erronea xanthodon</i> | <i>Trona stercoraria</i> | <i>Macrocypraea cervus</i> |
| BL: | 47 | 56 | 61 | 67 | 74 |
| | <i>Blasicrura teres</i> | <i>Luria pulchra</i> | <i>Cypraea pantherina</i> | <i>Trona stercoraria</i> | <i>Erosaria caputserpentis</i> |
| lt: | e | 1 | p | u | M |
| | <i>Ovatipsa chinensis</i> | <i>Mauritia mauritiana</i> | <i>Erosaria gangranosa</i> | <i>Mauritia eglantina</i> | <i>Erosaria dillwyni</i> |
| ct: | f | 1 | q | x | P |
| | <i>Monetaria annulus</i> | <i>Mauritia mauritiana</i> | <i>Erosaria gangranosa</i> | <i>Mauritia scurra</i> | <i>Cypraeovula capensis</i> |

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Burial Experiments on Marine Pelecypods from Tomales Bay, California

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INTRODUCTION

BURIAL EXPERIMENTS and the after-effects on *Tellina salmonaea*, *Tellina buttoni*, and *Transennella tantilla* have not as yet been reported. The harmful effects of high concentrations of particulate matter and microorganisms to filtering and feeding in bivalves have been investigated by many. For example, LOOSANOFF & ENGLE (1940, 1947), LOOSANOFF & TOMMERS (1948), CHIPMAN & HOPKINS (1954), BALLENTINE & MORTON (1956), CHIBA & OHSHIMA (1957), LOOSANOFF (1962), and ARMSTRONG (1965) have all been concerned with various aspects of this problem.

In a field study MAURER (1966) described some pelecypod-sediment associations in Tomales Bay, California. The author concluded that distribution and abundance of *Tellina buttoni* DALL, 1900, *Tellina salmonaea* (CARPENTER, 1864), *Mysella tumida* (CARPENTER, 1864), and *Lyonsia californica* CONRAD, 1837 were influenced by

sediment type, while that of *Transennella tantilla* (GOULD, 1852) were not. Furthermore it was shown that the average size of *Tellina buttoni*, *Tellina salmonaea*, and *Mysella tumida* was statistically associated with sediment size. No conclusions were drawn as to the biological significance of sediment to mollusks in terms of food, protection, larval sites, and certain conditions of turbidity.

In order to interpret the pelecypod-sediment relationships and to determine the importance of sediment to mollusks some filtering experiments were performed (MAURER, 1967). *Transennella tantilla* combined the highest filtering rate with the least apparent difficulty in filtering suspensions of carmine, kaolinite, and india ink particles. *Tellina salmonaea* had the lowest clearing rate and had far less difficulty ingesting and digesting the suspensions than *Tellina buttoni* which had a relatively high filtering rate, but commonly became filled with particles from the suspensions. Results of these experiments suggested that sediment may represent a source of food or a certain turbidity regime.